Per- and Polyfluoroalkyl Substances (PFAS)

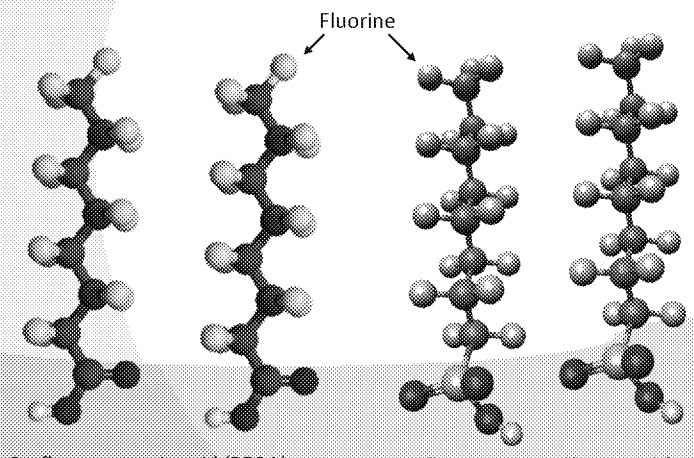
DATE TBD

U.S. Environmental Protection Agency

Outline

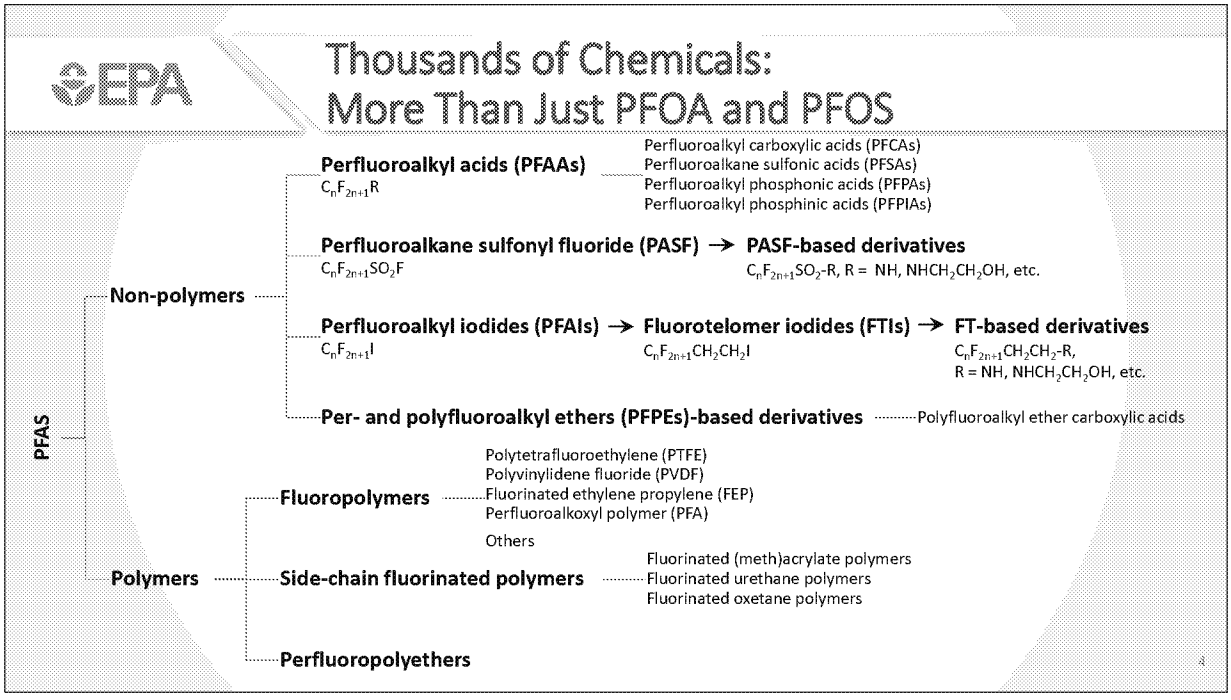
- What are Per- and Polyfluoroalkyl Substances (PFAS)?
- How are PFAS used?
- What is EPA doing about it?

Per- and Polyfluoroalkyl Substances (PFAS)



Perfluorooctanoic acid (PFOA) *Perfluorooctanesulfonic acid (PFOS)*

- **A class of man-made chemicals**
  - Chains of carbon (C) atoms surrounded by fluorine (F) atoms
    - Water-repellent
    - Stable C-F bond
  - Some PFAS include oxygen, hydrogen, sulfur and/or nitrogen atoms, creating a polar end

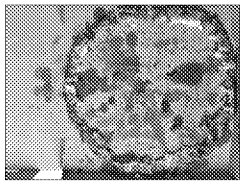


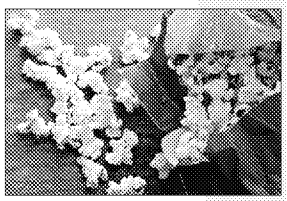
PFOA = perfluorooctanoic acid – PFCA
PFOS = perfluorooctanesulfonate – conjugate base of PFSA

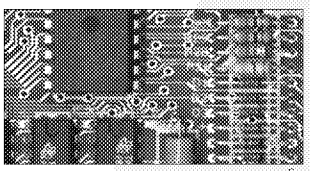
"Per" = fully fluorinated
"Poly" = many fluorines

Used in Homes, Businesses & Industry

- Food contact surfaces such as cookware, pizza boxes, fast food wrappers, popcorn bags, etc.
- Polishes, waxes, and paints
- Stain repellants for carpets, clothing, upholstered furniture, etc.
- Cleaning products
- Dust suppression for chrome plating
- Electronics manufacturing
- Oil and mining for enhanced recovery
- Performance chemicals such as hydraulic fluid, fuel additives, etc.





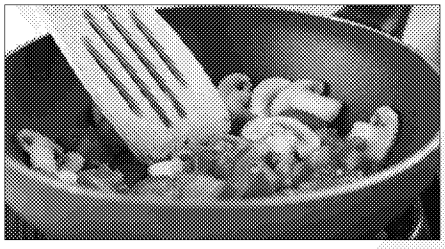


Sources of PFAS in the Environment

- Direct release of PFAS or PFAS products into the environment
  - Use of aqueous film forming foam (AFFF) in training and emergency response
  - Release from industrial facility
- Landfills and leachates from disposal of consumer and industrial products containing PFAS
- Land where wastewater treatment plant biosolids was applied

Reasons for Concern

- Known or suspected toxicity, notably for PFOA and PFOS
- Resist decomposition in the environment and in human bodies
- Used by a variety of industries
- Found in a variety of consumer products
- Most people have been exposed to PFAS



EPA's Current PFAS Activities

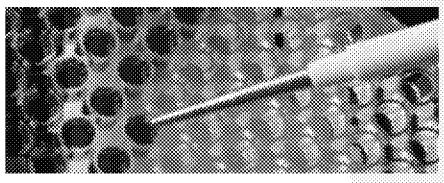
- **Issues related to PFAS involve most EPA Programs and Regions**
- **Four broad goals:**
  - Fill data gaps related to human health toxicity to inform public concerns and risk mitigation
  - Establish validated methods for measuring many PFAS in different media
  - Reduce environmental exposures
  - Assure accurate and timely risk communications

EPA's PFAS Coordinating Committee

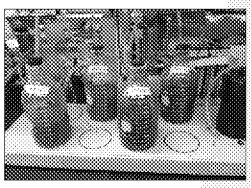
- **EPA announced cross-Agency effort to address PFAS in December 2017**
- **As part of that effort, EPA will:**
  - Identify a set of near-term actions that EPA will take to help support local communities
  - Enhance coordination with states, tribes and federal partners to provide communities with critical information and tools to address PFAS
  - Increase ongoing research efforts to identify new methods for measuring PFAS and filling data gaps
  - Expand proactive communications efforts with states, tribes, partners and the American public about PFAS and their health effects
- **EPA's Office of Research and Development and Office of Water are leading these efforts**
  - Includes members from EPA's air, chemicals, land, water, enforcement, and research offices as well as EPA regions to enhance cooperation with partners at the state and local level

Current PFAS Research Activities

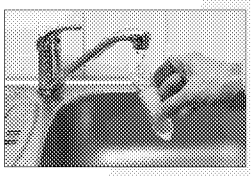
- **Human Toxicity**
  - Understand human health toxicity
  - Inform risk mitigation activities
  - Chemical library and high throughput toxicity testing



- **Laboratory Methods**
  - Establish validated laboratory methods for measuring PFAS in different environmental media



- **Human Exposure**
  - Identify and estimate human exposure to PFAS from different sources
- **Drinking Water Treatment and Site Remediation**
  - Reduce PFAS exposures
  - Treat and remediate drinking water and contaminated sites

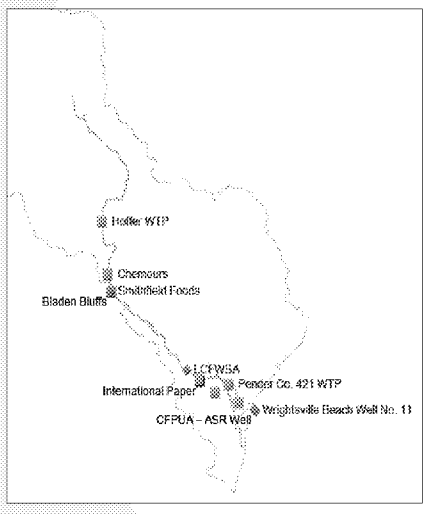


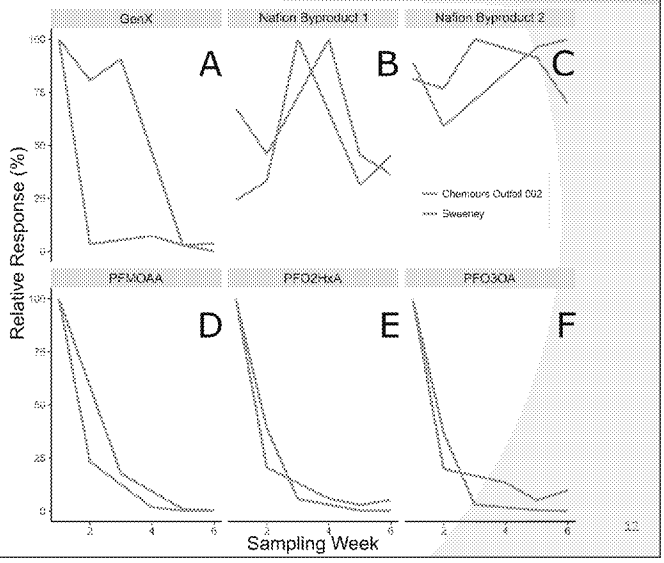
Technical Support to North Carolina

- EPA, in collaboration with North Carolina State University, has been conducting PFAS research in the Cape Fear River for the last 10 years
- Recent work using non-targeted analysis identified ~15 novel PFAS in the Cape Fear River downstream (but not upstream) of a chemical production plant producing Gen X and Nafion
- GenX was also found in downstream finished drinking water
  - Mean concentration of 631 ng/L
  - Local press picked up on the published results
- Upon discovery, North Carolina Department of Environmental Quality (NC DEQ) worked with the chemical production facility to reduce discharges under their permit
- NC DEQ, in consultation with EPA, established a Health Goal for GenX in drinking water (140 ppt)
- NC DEQ and EPA partnered to monitor the effectiveness of discharge reduction, sampled over 8 weeks at 13 locations, established that GenX levels in drinking water fell below the Health Goal after several weeks
- Continued sampling by NC DEQ has also found PFAS in well water near the facility; actions are ongoing

More States are requesting EPA technical support for contaminated sites

PFAS in North Carolina





Current PFAS Activities in Water

- **Published Drinking Water Health Advisories (HA) in 2016 for PFOA and PFOS**
  - HAs are non-regulatory information for federal, state and local officials to consider when addressing drinking water contamination
  - Identified 0.07 µg/L (70 parts per trillion) as the HA level for PFOA and PFOS combined and provided information about treatment and monitoring
- **Evaluating PFOA and PFOS for regulatory determination under the Safe Drinking Water Act (SDWA)**
  - PFOA and PFOS are on the fourth Contaminant Candidate List (CCL 4) published in November 2016. OW is assessing PFOA and PFOS against the three SDWA regulatory determination criteria
    - *May have an adverse effect on the health of persons*
    - *Is known to occur or there is a substantial likelihood that it will occur in public water systems with a frequency and at levels of public health concern*
    - *In the sole judgment of the Administrator, regulating the contaminant presents a meaningful opportunity for health risk reductions for persons served by public water systems*
  - From 2013 to 2015, EPA collected nationally representative data on the occurrence of six PFAS in public water systems (including PFOA and PFOS)
  - EPA must decide whether or not to regulate at least five CCL4 contaminants by January 2021

Current PFAS Activities for Waste Sites

- **EPA Federal Facility Superfund Program**
  - Program is actively engaged in a PFAS cleanup process at 32 Federal Facility National Priorities List (NPL) sites
  - It is anticipated that this number will grow since there are known or suspected contaminations of PFAS at many of the 80 DOD Federal Facility NPL Sites
  - PFAS detections in groundwater range from non-detect (based on analytical method limitations) or slightly exceeding the Drinking Water Health Advisory of 70 parts per trillion (ppt; PFOA and PFOS combined) to 2,000,000 ppt
  - Drinking water has been impacted at 17 of these Federal Facility NPL sites
- **Office of Superfund Remediation and Technology Innovation (OSRTI)**
  - 15 known impacted non-Federal NPL sites
  - 100s of potential NPL sites (e.g. 100 metal plating sites, 300 landfills)
- **Regional Assistance**
  - Holding site-specific consultations with EPA Regions on investigations of PFAS contamination

Current PFAS Activities in Chemical Use

- **PFOA Stewardship Program**
  - Eight companies participated in the program and successfully eliminated production of PFOA
  - Resulted in phase-out of PFOA and related PFAS, including potential PFOA precursors, by these companies by the end of 2015.
- **EPA's New Chemicals Program**
  - Since 2000 have reviewed hundreds of pre-market alternatives for PFOA and related chemicals. Most were approved with restrictions and data-generation requirements.
- **Significant New Use Rule (SNUR)**
  - Proposed on January 21, 2015, to require manufacturers, importers, and processors of PFOA and related chemicals (including as part of articles), to notify EPA at least 90 days before starting or resuming new uses of these chemicals in any products
  - Notification provides EPA opportunity to conduct risk assessment/management for the new use
- **GenX**
  - Determining the need to revise the GenX risk assessment originally done for its pre-market approval, based on data received by the company and other information arising from the NC situation